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New West Indian Lejeuneae—II

ALEXANDER W. EVANS

(WITH PLATE 45)

In the first paper of this series, published in the BULLETIN for August 1908, six species of *Lejeuneae* from various islands of the West Indies were described and figured. One of these species, *Leiolejeunea grandiflora*, was proposed as the type of a new genus; the others belonged to genera that had been more or less fully discussed by the writer in a series of papers on the Hepaticae of Puerto Rico.* In the present paper three additional species are considered, all from the island of Jamaica. The genera to which they belong, *Diplasiolejeunea*, *Leptocolea*, and *Rectolejeunea*, are likewise among those discussed in connection with the Puerto Rico Hepaticae. The type specimens of the new species are preserved in the herbarium of the writer at New Haven, Connecticut.

Diplasiolejeunea Johnsonii sp. nov.

Pale green or yellowish, growing in depressed mats: stems 0.12 mm. in diameter, abundantly but irregularly branched, the branches obliquely spreading, similar to the stem but usually with smaller leaves: leaves of stems and leading branches closely imbricated, the lobe obliquely to widely spreading, distinctly convex, the margin usually revolute in apical and postical portions, orbicular-ovate, 1.1–1.5 mm. long, 1–1.2 mm. wide, antical margin rounded at the base and arching across the axis, outwardly curved to the broad and rounded apex, postical margin also curved; lobule inflated in carinal portion, otherwise more or less appressed to the lobe, obovate, 0.75 mm. long, 0.4 mm. wide, keel arched, forming a continuous line with the revolute portion of the lobe, free margin scarcely involute except at the very base, apical tooth obliquely spreading, triangular, acute or obtuse, tipped by a single conical or rounded cell, rarely by two superimposed cells, mostly four or five cells long and three to five cells wide at the base, proximal tooth obtuse and much shorter, usually consisting of a single projecting cell reinforced by a second cell coalescent with

* Bull. Torrey Club 29: 496. 1902. Et seq.

the inner surface of the lobule, hyaline papilla usually distal; cells of lobe averaging about 18μ at the margin and $30 \times 25\mu$ in the median and basal portions, walls more or less thickened, with small but distinct triangular trigones and occasional intermediate thickenings: underleaves contiguous or subimbricated, broadly cuneate, about 0.3 mm. long (0.15 mm. to the bottom of the sinus) and 0.45 mm. wide, bifid about one half with broad and rounded obliquely spreading divisions and an acute sinus: inflorescence autoicous: ♀ inflorescence borne on a leading branch or on a more or less abbreviated branch, the innovation usually simple and sterile but sometimes bearing a second female flower; bracts obliquely spreading, sharply complicate, the keel with a very narrow wing, bifid about one fourth, the lobe narrowly oblong-obovate, 0.75×0.18 mm., rounded at the apex, lobule a little shorter and narrower, 0.68×0.15 mm., rounded at the apex; bracteole ovate, 0.68 mm. long, 0.3 mm. wide, bifid about one eighth with erect rounded to obtuse divisions and a broad obtuse sinus; perianth oblong-obovate, 1.1 mm. long, 0.6 mm. wide, truncate at the apex and with a very short beak, more or less compressed and sharply five-keeled: ♂ inflorescence occupying a short branch, not proliferating; bracts mostly in from four to six pairs, imbricated, inflated, subequally bifid with a strongly arched keel and rounded divisions; bracteoles oblong-quadrate, bifid about one third with rounded divisions: mature sporophyte not seen. (PLATE 45, FIGURES 1-6.)

On bark of trees. Jamaica: Cinchona, *D. S. Johnson* (14), April 1903; *Evans* (250 in part), July 1903. No. 14 may be designated the type.

It can not be stated with certainty whether *D. Johnsonii* is gemmiparous or not. A few young gemmae were observed on the lower surface of a single lobe, but they may not have developed in this situation. The species is characterized by the strongly convex lobes with the apical and postical margins tending to be revolute, by the peculiar teeth of the lobules, by the broad and rounded divisions of the underleaves, by the autoicous inflorescence, and by the rounded divisions of the perichaetial bracts and bracteoles. The revolute portion of the lobe usually involves the junction of the lobe with the lobule, one effect being that the end of the sinus is displaced to the lower surface of the lobe. The apical tooth of the lobule is in the form of a triangle about as broad as high, and the apex is sometimes slightly curved to one side. The proximal tooth looks at first as if it were composed of a

single projecting cell. Closer inspection, however, shows that the conditions are more complicated, and that a second cell on the inner surface of the lobule is coalescent with this projecting cell and with the two cells at its base. In other words the lobule is two cells thick where the proximal tooth is situated, a peculiarity which has not yet been recorded in any other member of the genus. The divisions of the underleaves often attain a width of from ten to twelve cells.

Five species of *Diplasiolejeunea* are now definitely known from Jamaica, the others being *D. pellucida* (Meissn.) Schiffn., *D. brachyclada* Evans, *D. unidentata* (Lehm. & Lindenb.) Schiffn., and *D. Rudolphiana* Steph. Since these species occur also in Puerto Rico, they have been described and figured by the writer.* Two of them, *D. brachyclada* and *D. Rudolphiana*, agree with *D. Johnsonii* in being autoicous, while the two others are definitely dioicous. In *D. Rudolphiana* and *D. unidentata*, which seem to be closely related to the new species, the lobes of the leaves, although convex, are not revolute in the vicinity of the keel, so that the end of the sinus is not displaced. The underleaves in these two species have much in common with those of *D. Johnsonii*, and their divisions are fully as broad; they show, however, a distinct narrowing toward the apex. Their lobular teeth show much more striking differences. In *D. Rudolphiana* the apical tooth is remarkably long and slender and is usually subparallel with the axis instead of being broadly triangular and spreading obliquely. In *D. unidentata* the tooth is oblique and about as long as in *D. Johnsonii*, but it is more slender and is usually tipped with two superimposed cells, a condition rarely found in the new species. The most important differences in the proximal teeth have already been mentioned. In the material collected by the writer *D. brachyclada* grows mixed with *D. Johnsonii*, but the two species are amply distinct. The underleaves of *D. brachyclada* have narrow and sharply pointed divisions, the apical teeth of the lobules are often truncate or t-shaped and are usually only one cell broad, the perichactial bracts and bracteoles are more deeply bifid, and the divisions of the latter are acute. Similar differences

* Bull. Torrey Club 39: 209-223. pl. 16, 17. 1912.

will separate *D. Johnsonii* from *D. pellucida*, which latter, moreover, almost invariably grows on leaves.

***Leptocolea appressa* sp. nov.**

Pale green, growing in closely appressed mats: stems 0.05 mm. in diameter, sparingly and irregularly pinnate, the branches obliquely spreading, similar to the stem but with somewhat smaller leaves: stem leaves imbricated, the lobe widely spreading, falcate, ovate-oblong, 0.5–0.6 mm. long, 0.3–0.4 mm. wide, broad and rounded at the apex, antical margin arching considerably beyond the axis, strongly outwardly curved from base to apex, postical margin straight or slightly curved, forming a rounded indentation with the keel, margin very minutely crenulate from projecting verruculae; lobule inflated throughout, ovate, 0.14 mm. long, 0.08 mm. wide, keel arched, apical tooth consisting of two cells in a row, proximal tooth shorter, consisting of a sharp or blunt projecting cell, teeth separated by a very narrow sinus containing a marginal hyaline papilla; stylus (at base of lobule) consisting of a papilla; cells of lobe averaging 5μ at the margin, $9 \times 7\mu$ in the middle, and $20 \times 7\mu$ at the base, wall more or less uniformly thickened but without distinct trigones except in median and basal regions, each cell bearing a median verrucula on the free outer wall except in the basal portion of the leaf; ocelli usually four, arranged in a short median row and averaging about $35 \times 23\mu$: inflorescence autoicous (but many plants apparently unisexual): ♀ inflorescence borne on a more or less elongated branch, innovating on one side, the innovation usually short and sterile; bracts obliquely spreading, complicate, keel sharp but without a wing, lobe oblong-obovate, 0.45 mm. long, 0.25 mm. wide, rounded at the apex, margin as in the leaves, ocelli several, forming an elongated patch several cells wide, lobule obovate, 0.25 mm. long, 0.2 mm. wide, rounded and irregularly dentate at the apex; perianth about one fourth exserted, obovate, 0.45 mm. long, 0.4 mm. wide, truncate at the apex with a distinct beak, five-keeled in the upper part, the lateral keels sharp, antical keel low and short, postical keels obtuse but extending almost to the base, lateral keels minutely and irregularly denticulate from projecting cells, surface otherwise smooth or nearly so: ♂ inflorescence (so far as observed) borne on a leading branch; bracts in one to three pairs, monandrous, similar to the leaves but smaller and more obliquely spreading or even suberect: mature sporophyte not seen. (PLATE 45, FIGURES 7–16.)

On bark of trees. Jamaica: John Crow Peak, *Evans* (104),

July 1903; Clyde Valley, *Evans* (270), July 1903. No. 104 may be considered the type.

Although *L. appressa* is fairly large it is not conspicuous because both stems and leaves are firmly appressed to the bark. The ocelli form a striking feature of the species and are almost always arranged in a row of four, extending from the base of the lobe outward and thus simulating a short nerve (FIGURE 8). The contrast in size between the ocelli and the adjacent leaf cells is usually marked but sometimes, especially on the carinal side of the row, one or two series of cells are distinctly elongated and form a sort of transition between the ocelli and the ordinary cells. Occasionally similar elongated cells are to be observed in small number near the outer extremity of the row. The peculiar contents of the ocelli, however, will serve to distinguish them in case of doubt.

The new species produces gemmae in greater or less abundance, and these agree in method of development and in general structure with those found in other members of the genus.* Each consists at maturity of a flat broadly orbicular disk, about 0.07 mm. long and 0.09 mm. wide (FIGURE 16). The margin is very vaguely crenulate from projecting cells, there are three organs of attachment, and each half of the gemma shows twelve cells, their relative position indicating that the apical quadrants in the young gemma cut off four segments apiece. The gemmae bear a marked resemblance to those of *Leptocolea scabriflora* (Gottsche) Evans, a widely distributed species in the American tropics.

A close relative of *L. appressa* is ***Leptocolea floccosa*** (Lehm. & Lindenb.) comb. nov.,† a species originally described from the Philippines but since reported from both Java and Japan. In this species, which grows on leaves, the plants are closely appressed, just as in *L. appressa*, the ocelli (usually four in number) form a short false nerve, and the outer surfaces of the leaves are minutely roughened by rounded verruculae borne singly on the cells. The East Indian plant, however, is somewhat smaller, the lobes measur-

* For a discussion of the genus *Leptocolea* see Evans, Bull. Torrey Club 38: 251-286. pl. 11, 12. 1911.

† = *Jungermannia floccosa* Lehm. & Lindenb. in Lehmann, Pug. Plant. 5: 26. 1832. *Lejeunea floccosa* Lehm. & Lindenb. in G. L. & N. Syn. Hep. 324. 1845. *Lejeunea* (*Colo-Lejeunea*) *floccosa* Steph. Hedwigia 29: 18. 1890. *Cololejeunea floccosa* Schiffn. Conspect. Hepat. Archip. Indici 243. 1898.

ing about 0.35×0.25 mm. or even less, the lobes are less falcate and spread more obliquely, the leaf cells are a little larger, averaging about $12 \times 8\mu$ in the middle of the lobe, the margin is entire, and the lobes are bordered by a smooth band from three to five cells wide except near the end of the keel, where it is narrower. According to Schiffner the lobule in *L. floccosa* is unidentate, but the specimens from Japan, which agree in all other respects with Schiffner's description and figures,* show bidentate lobules as in most members of the genus. The proximal tooth is remarkable in being the longer of the two, measuring from two to four cells in length and two or three cells in width at the base. It is sharply acute or even acuminate and is either straight, when it continues the free margin, or else it is more or less strongly curved toward the end of the keel. An exceedingly short indentation separates the proximal from the apical tooth. The latter consists normally of two cells, as in *L. appressa*, but is sometimes reduced to a single cell. Instead of spreading widely from the margin it extends toward the proximal tooth, thus tending to fill up the indentation between them and making it difficult to demonstrate. The hyaline papilla could not be clearly made out in the fragmentary material examined by the writer.

Two other species which are apparently close to *L. appressa* are *Lejeunea* (*Colo-Lejeunea*) *platyneura* Spruce,† of Brazil, and *Cololejeunea peraffinis* Schiffn.,‡ of Java. Both are known to the writer by description only but should probably be referred to the genus *Leptocolea*. They are distinguished by false nerves composed of ocelli, but these are arranged in two or more rows instead of in a single row. *Lejeunea platyneura* grows on leaves, its leaf cells are considerably larger than in *L. appressa*, measuring in the middle of the lobe $25\text{--}33\mu$ (according to Spruce), and there are further differences in the bracts. In *C. affinis* the median leaf cells measure about $14 \times 8\mu$ (according to Schiffner), and the lobular teeth are more complex than in *L. appressa*.

* Nova Acta Acad. Caes. Leop.-Carol. 60: 242. pl. 9. f. 11-13. 1893.

† Hep. Amaz. et And. 299. 1884.

‡ Nova Acta Acad. Caes. Leop.-Carol. 60: 242. pl. 9. f. 8-10. 1893.

***Rectolejeunea Maxonii* sp. nov.**

Pale green, becoming whitish or yellowish with age, growing in depressed mats: stems 0.05 mm. in diameter, copiously and irregularly branched, the branches widely spreading, usually similar to the stem but occasionally microphyllous: leaves loosely imbricated, the lobe plane, widely spreading, slightly falcate, broadly ovate, 0.5 mm. long, 0.4 mm. wide, antical margin more or less rounded at the base, then strongly outwardly curved to the broad and rounded apex, postical margin slightly curved or straight, forming a continuous line with the keel or slightly indented at the junction, margin slightly and irregularly crenulate from projecting cells; lobule usually well developed, inflated, broadly ovate, 0.1 mm. long, 0.09 mm. wide, keel more or less arched, free margin involute to the apex, apical tooth short and straight, hyaline papilla in a shallow indentation, sinus slightly lunulate; cells of lobe plane or more or less convex, averaging about 12μ at the margin, 22μ in the middle, and $27 \times 22\mu$ at the base, apparently uniformly thickened but showing upon careful focusing minute trigones and rare intermediate thickenings; ocelli none: underleaves distant, orbicular, about 0.17 mm. long, bifid about one half with erect, usually obtuse or rounded divisions and an obtuse to acute sinus, cuneate at the base, margin entire or vaguely and irregularly crenulate from projecting cells: inflorescence dioicous: ♀ inflorescence sometimes borne on a leading branch, sometimes on a more or less abbreviated branch, innovating on one side, the innovation sometimes simple and sterile but often soon again floriferous; bracts obliquely spreading, complicate, the keel sharp but not winged, lobe plane or nearly so, oblong-ovate to oblong-obovate, 0.5–0.6 mm. long, 0.35 mm. wide, rounded at the apex or very obtusely pointed, lobule ovate to oblong, 0.3 mm. long, 0.15 mm. wide, obtuse to rounded at the apex, margin of bracts as in the leaves; bracteole free from the bracts, ovate to obovate, 0.45 mm. long, 0.3 mm. wide, bifid about one third with rounded to subacute divisions and a narrow acute sinus; perianth about half exserted, obovate, 0.75 mm. long, 0.55 mm. wide, slightly emarginate at the apex with a short but distinct beak, the upper angles rounded, cuneate at the base, compressed, antical keel low and short, postical keel long, two-angled, surface smooth or (especially along the keels) slightly and irregularly roughened from projecting cells: ♂ inflorescence at first terminal on a more or less elongated branch but soon becoming intercalary through apical proliferation; bracts mostly in from two to six pairs, slightly imbricated, strongly inflated with an arched keel, shortly bifid with rounded divisions, the lobule

a little shorter than the lobe; bracteoles similar to the underleaves but smaller, restricted to the base of the inflorescence: capsule about 0.3 mm. in diameter; spores greenish, minutely verruculose, irregular in form, about 12μ in short diameter; elaters about 9μ in diameter, with a single spiral. (PLATE 45, FIGURES 17-27.)

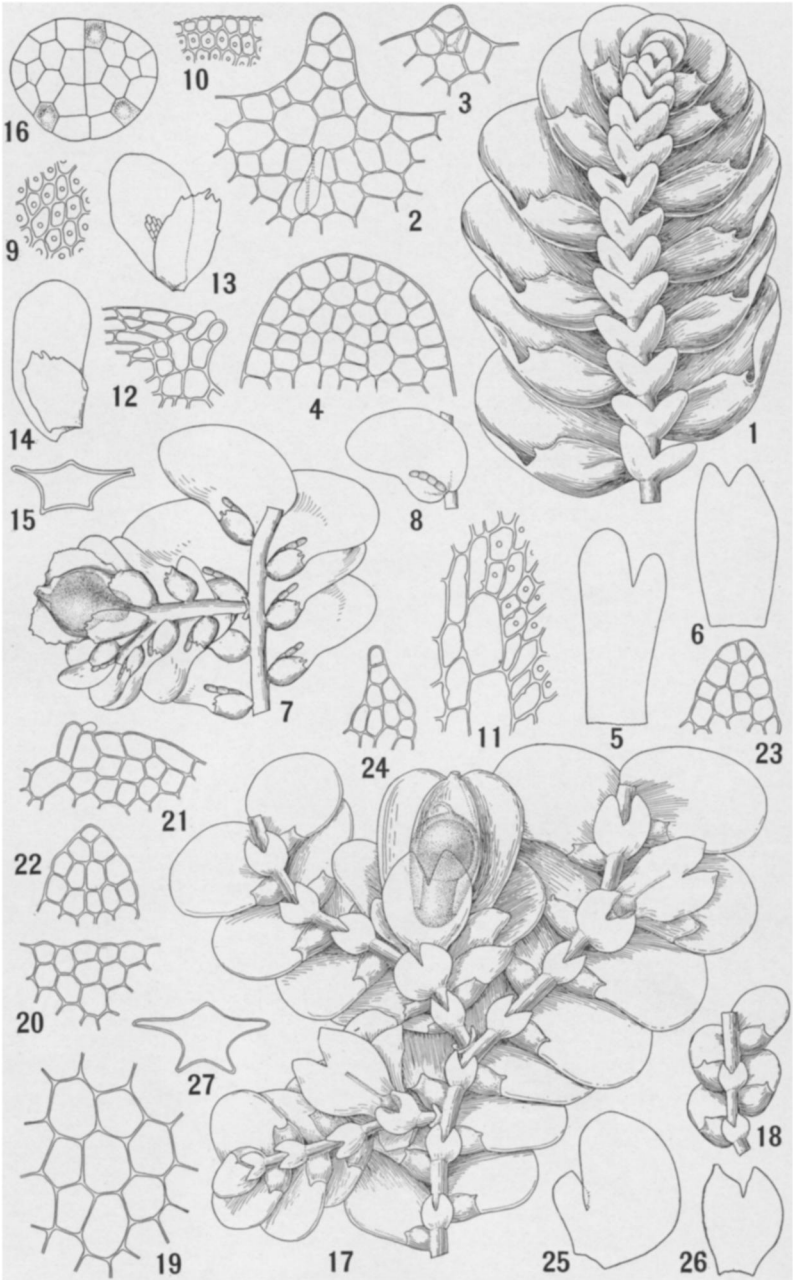
On bark of trees. Jamaica: Cinchona, *L. M. Underwood* (495), February 1903; *W. R. Maxon* (1361), April 1903; *Evans* (143 in part), July 1903. No. 1361 may be regarded as the type.

The microphyllous branches mentioned in the description are not abundant in the material examined, and little can be said in regard to their significance. In typical cases a branch of this character (FIGURE 18) exhibits the peculiarities associated with the genus *Microlejeunea*. The lobes of the leaves are ovate and suberect and measure only 0.18×0.11 mm., while the lobules are relatively large and measure about 0.13×0.1 mm. Such leaves are not very different from the rudimentary leaves found at the base of an ordinary branch, and it is possible that a microphyllous branch is simply one in which juvenile characters persist. Although similar branches have not yet been observed in other members of the genus, their occurrence would not be surprising.

A short time ago the writer proposed a new species of *Rectolejeunea* from the Bahama Islands, under the name *R. Brittoniae*,* and pointed out its close relationship to the widely distributed *R. phyllobola* (Nees & Mont.) Evans.† The new plant from Jamaica belongs in the same group of species. In its dicocious inflorescence it agrees with *R. Brittoniae* and differs from *R. phyllobola*; in the restriction of its perigonal bracteoles to the base of the spike it agrees with *R. phyllobola* and differs from *R. Brittoniae*. Vegetative reproduction is apparently of rare occurrence in *R. Maxonii*. When it takes place it is by means of caducous leaves, just as in the other known members of the genus, but these leaves are not borne on specialized shoots. In this respect, as well as in most of the characters drawn from the leaves, leaf cells, and perianths, it agrees further with *R. Brittoniae* and *R. phyllobola*. The underleaves, however, afford a few additional differences.

* Bull. Torrey Club 38: 209. pl. 9. f. 1-12. 1911.

† For a discussion of the genus *Rectolejeunea* see Evans, Bull. Torrey Club 33: 1-16. pl. 1, 2. 1906.



1-6. *DIPLASIOLEJEUNEA JOHNSONII* Evans
7-16. *LEPTOCOLEA APPRESSA* Evans
17-27. *RECTOLEJEUNEA MAXONII* Evans

They are somewhat smaller than those of *R. Brittoniae* but resemble them more closely in other respects than they do those of *R. phyllobola*. Their divisions are broad and triangular and are usually tipped with a single cell, making them obtuse (FIGURE 22), in rarer cases they are distinctly rounded at the apex (FIGURE 23), while in still rarer cases they are acute and tipped with two superimposed cells (FIGURE 24). This last condition, it will be remembered, is the usual one in *R. phyllobola*.

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Explanation of plate 45

The figures were drawn by the writer, and most of them were prepared for publication by Mr. Stanley C. Ball.

Diplasiolejeunea Johnsonii Evans. 1. End of a vigorous shoot, postical view, $\times 25$. 2. Apical tooth of a lobule, $\times 200$. 3. Proximal tooth of the same lobule, $\times 200$. 4. Apex of an underleaf division, $\times 200$. 5, 6. Bract and bracteole from a single involucre, $\times 35$. The figures were all drawn from the type specimen.

Leptocolea appressa Evans. 7. Stem bearing a female branch with a perianth, postical view, $\times 35$. 8. A leaf, antical view, $\times 35$. 9. Cells from middle of lobe, $\times 265$. 10. Cells from margin of lobe, $\times 265$. 11. End of a row of ocelli with neighboring cells, $\times 265$. 12. Apex of lobule, $\times 265$. 13, 14. Bracts from a single involucre, $\times 45$. 15. Transverse section of perianth in upper third, $\times 45$. 16. Gemma, $\times 265$. The figures were all drawn from the type specimen.

Rectolejeunea Maxonii Evans. 17. Part of a plant with two female inflorescences and a perianth, postical view, $\times 35$. 18. Part of a microphyllous branch, postical view, $\times 35$. 19. Cells from middle of lobe, $\times 265$. 20. Cells from margin of lobe, $\times 200$. 22. Apex of an underleaf division, typical structure, $\times 200$. 23, 24. Apices of underleaf divisions, deviations from the typical structure, $\times 200$. 25, 26. Bract and bracteole from a single involucre, $\times 35$. 27. Transverse section of a perianth near apex, $\times 35$. The figures were all drawn from the type specimen.